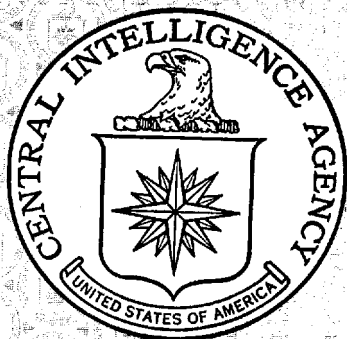


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CIA/RR CB 66-5
March 1966

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INTELLIGENCE BRIEF

SOVIET ELECTRIC POWER INDUSTRY
FULFILLS SEVEN-YEAR PLAN GOALS

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SOVIET ELECTRIC POWER INDUSTRY
FULFILLS SEVEN-YEAR PLAN GOALS*

Summary

Production of electric power in the USSR in 1965 was 507 billion kilowatt-hours (kwh), 1/ compared with the annual plan of 510 billion kwh. 2/ The percentage increase over the previous year, 10.5 percent, was the lowest since 1960. Although production was within the range of the seven-year plan goal, the gap between Soviet and US production in 1965 was greater than in 1958. More than 11,000 megawatts (mw) of new generating capacity was installed in 1965, 3/ the highest annual level to date. The annual plan for installation of new capacity was met, and the goal for the seven-year plan was overfulfilled. The following tabulation shows planned and actual production, and installation of capacity, for the seven-year plan period.

	<u>1959-65</u>	
	<u>Plan</u>	<u>Actual</u>
Production (billion kwh)	500 to 520	507
Average annual increase (percent)	11.4 to 12.0	11.6
Capacity installed (thousand mw)	58 to 60	61
Of which:		
Hydroelectric (thousand mw)	10 to 11	11.4
Thermal (thousand mw)	47 to 50	49.6
Average annual increase (percent)	11.0 to 11.3	11.5

* The estimates and conclusions in this brief represent the best judgment of this Office as of 2 March 1966.

The failure to fulfill the 1965 plan and a performance closer to the lower than to the higher limit of the seven-year plan goal were almost certainly the result of inadequate demand rather than a shortage of power. Installed capacity was sufficient to have provided for a greater production of electric power, had there been a demand for it. The recent reduction in the 1970 plan for the production of electric power, compared with Khrushchev's goal announced in 1961, reflects a reduction in the goal for industrial production. As a result, higher rates of growth will be required after 1970 if the ambitious goal of overtaking the United States in production of electric power by 1980 is to be achieved.

A number of technological achievements enabled the Soviet electric power industry to make great strides during the seven-year period. Among these were the construction of large powerplants using new large-capacity equipment, the introduction of supercritical temperatures and pressures at thermal powerplants, the use of the block principle in powerplant construction, and the use of high voltages for long-distance transmission of electric power. These measures have helped to reduce the costs and to improve the operating indexes of powerplants, to increase the centralization of power-producing capacity, and to establish unified transmission grids.

1. Electric Power Production

The USSR produced 507 billion kwh of electric power in 1965, slightly less than the annual goal of 510 billion kwh but within the range of the goal of the seven-year plan. Installed capacity increased at a satisfactory rate during the last few years of the seven-year period and could easily have supported a higher level of production, had there been a demand for it.

Although production in the USSR as a percentage of production in the United States increased from 30.6 percent in 1958 to 41.6 percent in 1965, the gap between US and Soviet production, measured in kilowatt-hours, continued to widen (see Table 1 and Figure 1). A comparison of probable US production in 1970 with the Soviet production goal for 1970, recently reduced from a range of 900 billion to 1,000 billion to between 840 billion and 850 billion kwh, indicates that the gap will be even greater in 1970. Lowering of the 1970 Soviet goal will necessitate a higher rate of growth after 1970 if the goal of surpassing the United States in production of electric power by 1980 is to be achieved.

Table 1

USSR and US: Gross Production of Electric Power
Selected Years, 1958-70

	Billion Kilowatt-Hours		Difference Between US and USSR	USSR as a Percent of US
	USSR	US		
1958	235	768	533	30.6
1962	369	1,001	632	36.9
1964	459	1,147	688	40.0
1965	507	1,220	713	41.6
1966 (Plan)	560	1,290	730	43.4
1970 (Plan)	840 to 850 <u>a/</u>	1,630 <u>b/</u>	790 to 780	51.5 to 52.1

a. 4/

b. Estimated on the basis of an average annual increase of 6 percent.

2. Technical Achievements in Powerplant Construction

Soviet engineers introduced considerable new technology during the seven-year plan, which had the effect of increasing efficiency and reducing costs. Equipment designed to operate at supercritical temperatures and pressures was put into service, but problems of metallurgy which have severely hampered successful operation of the generating units probably will require several more years to overcome. Standard designs were adopted for thermal powerplants, and the block principle, which combines one boiler aggregate in a block with one turbine and one transformer, was put into practice.

The capacities of individual new powerplants in the USSR and of the new equipment being installed in the plants were increased considerably during the seven-year period. In 1958 the largest thermal powerplant in the USSR had a capacity of 700 mw. At the end of 1965 there were 12 thermal powerplants with capacities of 1,000 mw or more. The largest plant, the Pridneprovskaya GRES in the Ukraine, reached a capacity of 2,100 mw in 1965, 5/ thereby becoming the largest thermal powerplant in the world, surpassing the Ravenswood powerplant in New York, which reached 1,800 mw in 1965. Thermal generating units of 100 mw, 150 mw, 200 mw, and 300 mw capacity were installed in large numbers during 1959-65, as shown in the following tabulation:

<u>Size of Unit</u> <u>(Megawatts)</u>	<u>1959-65</u>	
	<u>Plan <u>6/</u></u> <u>(Units)</u>	<u>Actual</u> <u>(Units)</u>
100	46	56
150	27	58
200	38	48
300	28	11
600	2	0

All of the above measures helped to reduce the cost of construction and to increase the operating efficiency of the powerplants. The average consumption of standard fuel in thermal powerplants was reduced from 485 grams per kilowatt-hour in 1958 7/ to 414 grams per kilowatt-hour in 1965. 8/ The average cost of construction of thermal powerplants was

reduced from 150 rubles* per kilowatt during 1953-58 to 140 rubles per kilowatt during 1959-65. 9/

A much larger reduction was achieved in the cost of construction of hydroelectric powerplants, from 341 rubles per kilowatt in 1953-58 to 214 rubles per kilowatt in 1959-65. 10/ This large decrease in cost was due mainly to the utilization of economical sites in East Siberia, where favorable natural conditions keep basic construction work to a minimum.

An achievement of the seven-year plan was the construction of the Bratsk hydroelectric powerplant in East Siberia with an operating capacity of 3,825 mw, which will be increased to 4,500 mw in the next two years. 11/ The Bratsk GES is at present almost twice the size of the largest hydroelectric powerplant in the US. Construction of the 5,000-mw Krasnoyarsk GES in East Siberia is well along, and a number of other very large hydroelectric powerplants are under construction.

The construction and operation of the 300-mw thermal generating units, which are designed to operate at supercritical steam pressures, have not been fully mastered and these units are still causing difficulties, particularly in the boiler aggregates. Because of difficulties in achieving operation at supercritical parameters, probably only a small part of the economies anticipated from installation of these units was realized. The plan for a 600-mw unit was discarded in favor of 500-mw units, the first of which has been produced and is to be installed in 1966. 12/ An 800-mw unit has been designed and is now being constructed, with installation planned in the next few years.

3. Technical Achievements in Transmission of Electric Power

The USSR leads the world in the high-voltage transmission of electric power. During the period of the seven-year plan, the length of high-voltage (35 kilovolt and above) transmission lines increased by over 200 percent 13/ and the plan goal was overfulfilled. More than 8,000 kilometers of 500-kilovolt (kv) alternating current transmission lines were put into operation; 14/ by contrast, the first

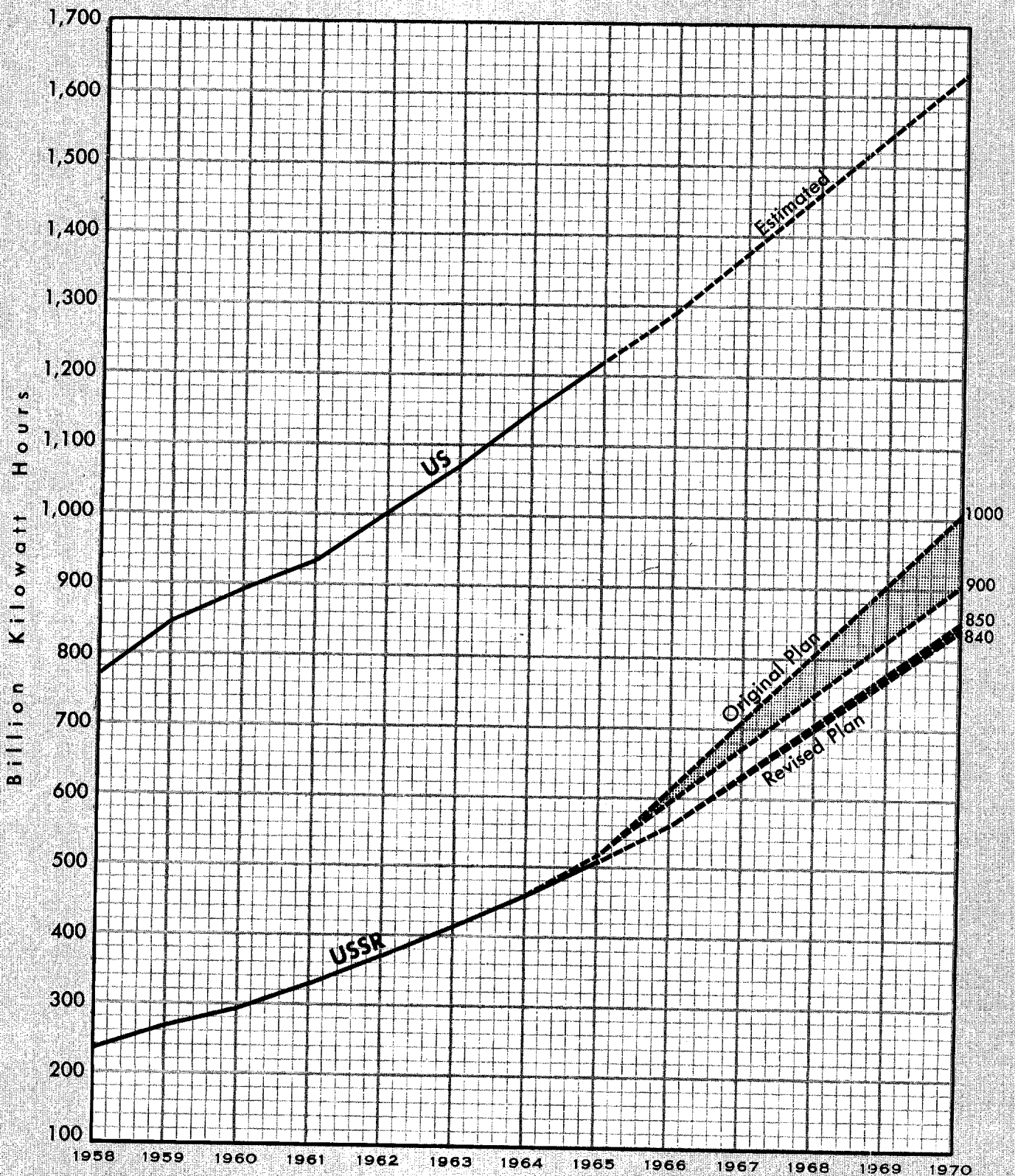
* A nominal rate of exchange based on the gold content of the respective currencies is 0.90 ruble to US \$1. This rate, however, does not necessarily reflect the dollar purchasing power of the ruble.

500-kw transmission line in the Western world was put into operation in the US in 1965. An experimental 800-kv direct current transmission line was constructed from Volgograd to the Donbas, and an experimental 750-kv alternating current line is now under construction between Moscow and Konakovo, 90 kilometers to the north. The operating experience with these lines is expected to aid in planning the future transmission of electric power over distances of 1,000 to 2,500 kilometers.

Nine large power systems are now in operation in the USSR. ^{15/} A number of these power systems have been joined to form a united power network for the European part of the USSR (see Figure 2), with a total capacity of 50,000 mw. ^{16/} This system is the basis for a planned national united power network which is expected to link all major industrial regions in the country over the next five years.

The increase in transmission lines and the growth of large power systems made it possible for the USSR to increase centralized power production from 85.5 percent of the total electric power produced in 1958 ^{17/} to about 93 percent in 1965. This development enabled Soviet engineers to retire hundreds of small, uneconomic powerplants and helped to reduce the average cost of production of electric power.

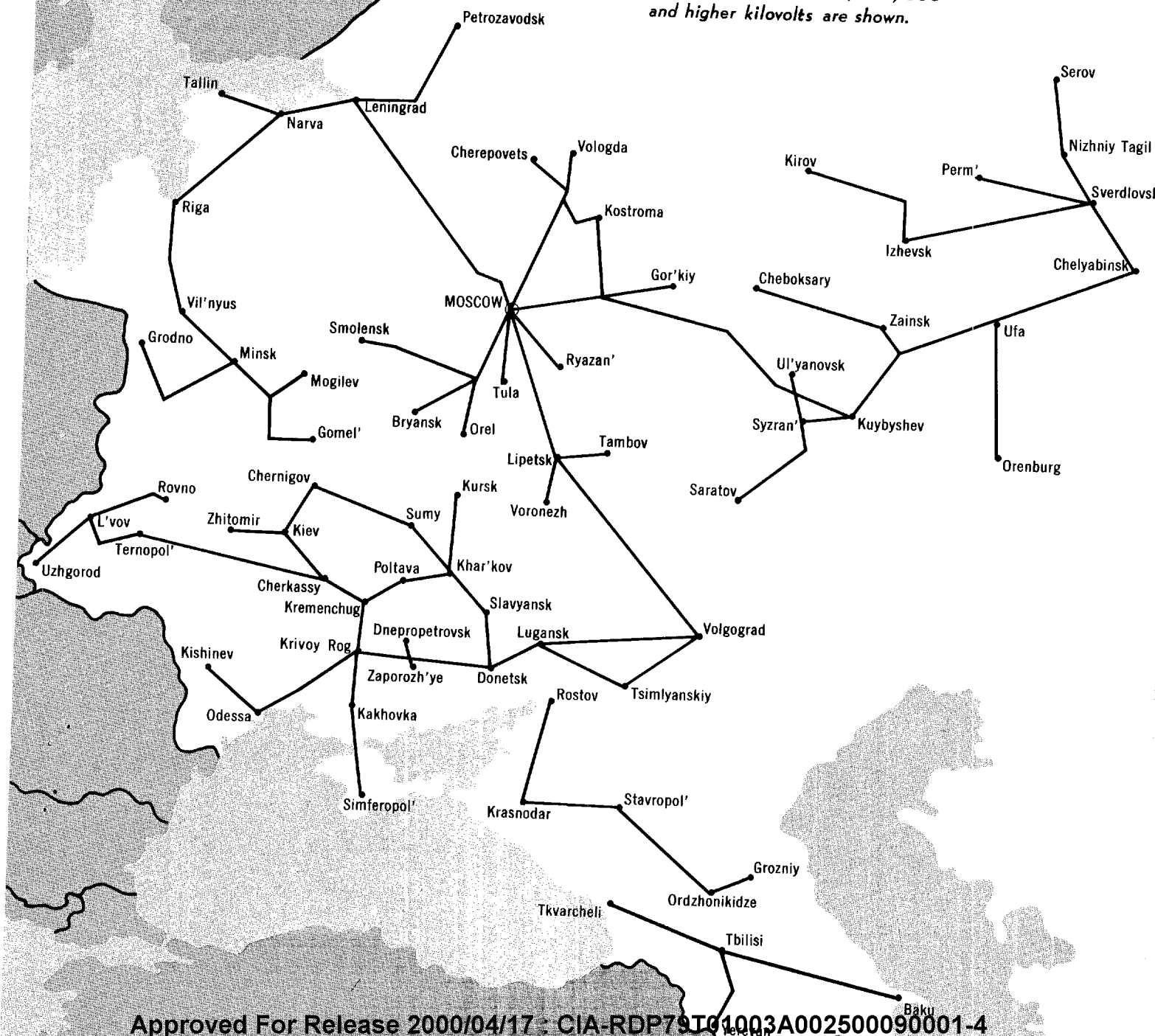
Gross Production of Electric Power 1958-70



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European USSR United Power System

*Transmission lines of 220, 330, 500
and higher kilovolts are shown.*



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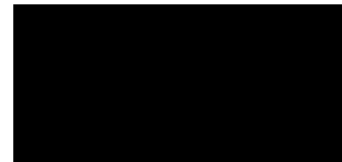
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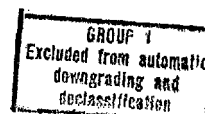


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